

WHAT IS CLAIMED IS:

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1. A method for pre-coding in a communication system, comprising:
2 determining pre-coder parameters;
pre-coding first data in accordance with said determined pre-coder
4 parameters;
transmitting said pre-coded first data; and
6 transmitting non pre-coded first reference data.
 2. The method as claimed in claim 1 wherein determining a pre-
2 coder parameters comprises:
receiving a reference data; and
4 determining the pre-coder parameters in accordance with said received
reference data and the reference data.
 3. The method as claimed in claim 1 wherein determining a pre-
2 coder parameters comprises:
receiving the non pre-coded first reference data;
4 determining the pre-coder parameters in accordance with said received
non pre-coded first reference data and the first reference data; and
6 transmitting said determined pre-coder parameters.
 4. The method as claimed in claim 3 further comprising:
2 receiving said determined pre-coder parameters; and
providing said determined pre-coder parameters to the pre-coder.
 5. The method as claimed in claim 1 wherein pre-coding first data in
2 accordance with said determined parameters comprises:
pre-coding a payload data; and
4 pre-coding a dedicated pilot data.
 6. The method of claim 1 wherein said transmitting a non pre-coded
2 reference data comprises:
transmitting a continuous non pre-coded reference data.

7. The method of claim 1 wherein said transmitting a non pre-coded
2 reference data comprises:
transmitting a discontinuous non pre-coded reference data.

8. The method of claim 1 wherein said transmitting a non pre-coded
2 reference data comprises:
transmitting a pilot data.

9. The method as claimed in claim 1, further comprising:
2 receiving the non pre-coded first reference data at least two antennae;
equalizing each of said received non pre-coded first reference data by an
4 equalizer and provide equalized non pre-coded first reference data;
determining the pre-coder parameters by adjusting characteristics of the
6 at least two equalizers in accordance with the received non pre-coded first
reference data and the first reference data; and
8 transmitting said determined pre-coder parameters.

10. The method as claimed in claim 9 wherein said determining the
2 pre-coder parameters by adjusting characteristics of the at least two equalizers in
accordance with the received non pre-coded first reference data and the first
4 reference data comprises:
optimizing a quality metric of a composite data comprising the equalized
6 non pre-coded first reference data.

11. A method for demodulating pre-coded data, comprising:
2 receiving a reference data and a pre-coded data; and
determining demodulator parameters in accordance with the said
4 received reference data and the reference data; and
demodulating the pre-coded data in accordance with said determined
6 demodulator parameters.

12. The method as claimed in claim 11 wherein the reference data
2 comprise a non pre-coded pilot signal.

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8 determine the pre-coder parameters in accordance with said
received non pre-coded first reference data and the non pre-coded first
reference data; and

10 a second transmitter communicatively coupled to said second processor
configured to transmitting said determined pre-coder parameters.

2 19. The apparatus as claimed in claim 18, wherein said first receiver
is further configured to:

4 receive said determined pre-coder parameters; and
provide said received pre-coder parameters to said pre-coder.

2 20. The apparatus as claimed in claim 16 wherein said pre-coder is
further configured to pre-code a second reference data in accordance with the
determined parameters; and

4 wherein said first transmitter is further configured to transmit the pre-
coded second reference data.

2 21. The apparatus as claimed in claim 16 wherein said first transmitter
is further configured to transmit the non pre-coded first reference data
continuously.

2 22. The apparatus as claimed in claim 16 wherein said first transmitter
is further configured to transmit the non pre-coded first reference data
discontinuously.

2 23. The apparatus of claim 16 wherein said non pre-coded first
reference data comprise a pilot data.

2 24. The apparatus as claimed in claim 20 wherein said first transmitter
is further configured to transmit the pre-coded second reference data
continuously.

2 25. The apparatus as claimed in claim 20 wherein said first transmitter
is further configured to transmit the pre-coded second reference data
discontinuously.

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26. The apparatus of claim 20 wherein said pre-coded second
2 reference data comprise a dedicated pilot data.

27. The apparatus as claimed in claim 16, further comprising:
2 at least two equalizers configured to accept the received non pre-coded
first reference data and provide equalized non pre-coded first reference data;
4 a processor communicatively coupled to said at least two equalizers;
a storage medium communicatively coupled to the processor and
6 containing a set of instructions executable by the processor to determine said
pre-coder parameters by adjusting characteristics of the at least two equalizers
8 in accordance with the received non pre-coded first reference data and the first
reference data; and
10 a second transmitter communicatively coupled to said processor
configured to transmit the determined pre-coder parameters.

28. The apparatus as claimed in claim 16 wherein said processor
2 determines said pre-coder characteristics by adjusting characteristics of the at
least two equalizers in accordance with the non pre-coded first reference data
4 the first reference data by executing a set of instructions to:
optimize a quality metric of a composite data comprising the equalized
6 non pre-coded first reference data.

29. An apparatus for demodulating pre-coded data, comprising:
2 a first receiver configured to:
receive a reference data and a pre-coded data; and
4 determine demodulator parameters in accordance with the said
received reference data and the reference data; and
6 a demodulator communicatively coupled to said receiver configured to
demodulate the pre-coded data in accordance with said determined
8 demodulator parameters.

30. The apparatus as claimed in claim 29 wherein the reference data
2 comprise a non pre-coded pilot signal.

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2 31. The apparatus as claimed in claim 29 wherein the reference data
comprise a pre-coded pilot signal.

2 32. The apparatus as claimed in claim 29 wherein the reference data
are continuous reference data.

2 33. The apparatus as claimed in claim 29 wherein the reference data
are discontinuous reference data.

2 34. A digital signal processing apparatus for pre-coding in a
communication system, comprising:
memory storage unit; and
4 a digital signal processor communicatively coupled to said memory
storage unit, and capable of executing instructions to:
6 determine pre-coder parameters;
pre-code first data in accordance with the determined pre-coder
8 parameters; and
assist in preparing the pre-coded first data and non pre-coded first
10 reference data for transmission.

2 35. A digital signal processing apparatus for demodulating pre-coded
data in a communication system, comprising:
memory storage unit; and
4 a digital signal processor communicatively coupled to said memory
storage unit, and capable of executing instructions to:
6 accept a reference data and a pre-coded data;
determine demodulating parameters in accordance with the accepted
8 reference data and the reference data; and
demodulate the pre-coded data in accordance with the determined
10 demodulating parameters.

2 36. An apparatus for pre-coding in a communication system,
comprising:
means for determining a pre-coder parameters;

6 means for transmitting said pre-coded first data and a non pre-coded first reference data.

37. An apparatus for demodulating pre-coded data, comprising:
 2 means for receiving a reference data and a pre-coded data; and
 means for determining demodulator parameters in accordance with the
 4 said received reference data and the reference data; and
 means for demodulating the pre-coded data in accordance with said
 6 determined demodulator parameters.